

CLAIMS

1. An apparatus for transmission of signals comprising:
- (a) a coder operable to generate a first output providing first data from which a
5 decoder can produce a reconstructed signal and a second output providing second, enhancement, data whereby a decoder receiving both the first and second data can produce a higher quality reconstructed signal; and
- (b) means operable to assemble packets of data for transmission, each packet containing:
- 10, primary data which includes the first data in respect of a temporal portion of the signal and the second data in respect of the same portion of the signal; and
- secondary data which includes the first data in respect of a different
temporal portion of the signal but lacks the second data in respect of that
15 portion.
2. An apparatus according to claim 1 in which said different temporal portion is a portion later than that represented by the primary data.
- 20 3. An apparatus according to claim 2 in which said different temporal portion is the portion directly following the portion represented by the primary data.
4. An apparatus according to claim 1 in which said different temporal portion is a portion earlier than that represented by the primary data
- 25 5. An apparatus according to ~~any one of the preceding~~ claims, in which the assembly means is arranged to include in each packet a sequence code to indicate the temporal sequence of the primary data contained in the packets.
- 30 6. An apparatus according to ~~any one of the preceding~~ claims, in which the coder is operable to produce a plurality of outputs providing enhancement data, successive sets of enhancement data representing successive improvements to the reconstructed signal quality, and in which the primary data includes all such outputs and the secondary data includes first data in respect of a like plurality of

different temporal portions of the signal and progressively smaller numbers of sets of second data in respect of those portions.

7. An apparatus according to ~~an one of the preceding claims~~ in which the signals are audio signals and the coder is an audio signal coder.

8. An apparatus according to claim 7 in which the coder is a sub-band coder, in which the first data include data in respect of lower frequency ones of the coder sub-bands, and the second, enhancement data include data in respect of higher frequency sub-bands.

9. An apparatus according to ~~any one of the preceding claims~~ in which the first data include binary representations of digital values and the second data include additional bits representing a finer resolution of the said digital values.

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10. An apparatus according to claim 8 in which the sub-band audio coder comprises:

(a) filter means to receive a sampld audio signal and to divide the signal into a plurality of sub-band signals each corresponding to a respective frequency sub-band;

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(b) a quantiser for quantising the sub-band signals;

(c) bit allocation means for adaptively determining the number of quantisation levels to be used by the quantiser in dependence on the signal characteristics;

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and wherein the quantiser has a first output for providing said first data, said first data comprising quantised values for one or more of said sub-bands, and a second output for providing said second data, said second data comprising, for at least one of the sub-bands in respect of which quantised values are provided at the first output, additional, enhancement, bits representing a less coarse quantisation of the values for that sub-band or sub-bands, and wherein the bit allocation means is operable to perform a first allocation operation in which a first predetermined quota of bits for the first output is allocated among the sub-bands followed by a second allocation operation in which a second predetermined quota

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of bits, for the additional bits at the second output, is allocated among the sub-bands.

11. A coder according to Claim 10 in which the second output also provides
5 quantised values for at least one sub-band in respect of which quantised values are not provided at the first output.

12. A coder according to Claim 10 ~~or 11~~ in which the quantiser has at least one
10 further output, in which the second and further output(s) in each case provide values for sub-bands not represented in any lower-order output and/or provide additional bits for sub-bands which are represented in a lower order output, and in which the bit allocation means is operable to perform a number of allocation operations equal in number to the number of outputs, each serving to allocate, for that output, a respective quota of bits among the sub-bands.

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13. An apparatus for reception of signals comprising:

(a) means for receiving packets of data, each packet containing

primary data which includes first data in respect of a temporal portion of
the signal and second, enhancement, data in respect of the same portion
20 of the signal; and

secondary data which includes the first data in respect of a different
temporal portion of the signal;

(b) a buffer for storing the received packets;

(c) a decoder capable of producing a reconstructed signal from the first data alone
25 and capable of producing a higher quality reconstructed signal from the first and second data together;

(d) control means operable to read from the buffer the primary data in respect of successive temporal portions of the signal and to forward them to the decoder; and, in the event that the primary data in respect of a temporal portion of speech
30 be absent from the buffer, to read instead the secondary data in respect of that temporal portion and forward it to the decoder.

14. An apparatus according to claim 13 in which the control means is operable, in said event that the secondary data in respect of a temporal portion of speech be

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absent from the buffer, to read the second, enhancement, data in respect of a different temporal portion of the speech signal and forward it to the decoder.

15. An apparatus according to claim 13 ~~or 14~~ in which each packet contains a sequence code to indicate the temporal sequence of the primary data contained in it, and the control means is operable to determine the temporal sequence of the packets by reference to the sequence code, irrespective of the actual order of receipt of the packets.

- 10 16. An apparatus according to ~~any one of Claims 13 to 15~~ in which the signals are audio signals and the decoder is an audio signal decoder.

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